SCIENCE.

FRIDAY, APRIL 16, 1886.

COMMENT AND CRITICISM.

AN ADDITIONAL ARGUMENT for the preservation and care of the levees of the lower Mississippi is afforded in an unexpected way. For many years great damage to stock, and human discomfort, in those regions, have been caused by small flies known as 'buffalo gnats' (Simulium). Very similar flies, with similar injurious habits, have long been well known in the valley of the Danube and elsewhere; but as the species that have been studied, breed, as a rule, in streams that are clear, rapid. and rocky, it has been a question of considerable importance how the insects bred in such great quantities in the low alluvial Mississippi country, — a question whose solution might, it was hoped, afford a means of checking the increase of the pest. The present spring Dr. Riley, and two of his assistants, Mr. F. M. Webster and Mr. Otto Lugger, have succeeded in determining the habits of the two known species; and it appears that they breed in the more swiftly running portions of the smaller creeks and bayous, which are permanent, and do not dry up in midsummer. They are found attached to the masses of driftwood and leaves, which form at points, and which, by impeding the streams below, form a more rapid current at the surface. The larvae and pupae have been absolutely connected with their respective adults, and a careful study of the general character of the breeding-places already indicates that the increase of the pests of late years is indirectly due to the crevasses in the levees.

DR. SHUFELDT, in a recent pamphlet published by the U. S. bureau of education, calls attention to the needs and shortcomings of anatomical museums in this country, and presents an outline of how such museums should be formed and conducted. The subject is of no little importance, from the fact that we have so few anatomical museums that serve as useful means of instruction, or indeed for any thing except as repositories of anatomical odds and ends and curiosities, of which medical students, as a rule, make no use. One cause of this condition is the general indifference or neglect of comparative anatomy in medical instruction, and the non-recognition of the principle that museums, to be educational, should be largely comparative. The author rightly insists upon greater attention being given to comparative morphology as a basis of medical progress, and censures the lack of system. We are glad also to see his protest against the misleading and expensive dried preparations so common in collections.

BY THE ADDRESS of President Adams before the Cornell alumni at their sixth annual dinner recently held in New York, the controversy over what shall be the character of the university work was revived. Cornell was one of the colleges established through the benefit of the Morrill grant of 1862. The fundamental intent of that grant was the endowment in each state of at least one college where the leading object should be, "without excluding scientific and classical studies, to teach such branches of learning as are related to agriculture and the mechanical arts, in order to promote the liberal and practical education of the industrial classes." The grant to New York consisted of land scrip for 990,000 acres. This scrip was bought by Mr. Cornell for about $500,000, and to this he added an equal sum from his own pocket. The land was located in the timber districts of Michigan, and now, at the end of twenty odd years, has realized to the college some three millions of dollars. The question is, whether the whole of this should be devoted in accordance with the original grant, or whether, on account of Mr. Cornell's additional contribution, and the large amount realized through his foresight, the college is only bound to devote a portion of the fund to education in agricultural and mechanical arts. We would call attention to what our correspondent H. N. has to say upon the matter.

SETTLEMENT OF LABOR DIFFERENCES.

WHETHER the pamphlet[1] from the pen of Mr. Joseph D. Weeks, which the Society for political education has just published, was or was not timed to the present crisis, we are not aware; but,

[1] New York, *Putnam*, 1886. 12°.

coming just at this time, both its value and its influence will be increased. The pamphlet is entitled "Labor differences and their settlement, a plea for arbitration and conciliation," and it is an able exposition of the causes underlying our present labor difficulties, together with an argument in favor of arbitration as the best method for their settlement.

No thoughtful man can have watched the development of labor troubles during the last few years with any feeling short of anxiety. The increase in the number and frequency of strikes, the growing percentage of them that are successful, the hostility and ill feeling too often shown by employers and employed, have all forced themselves upon our notice, but society seems helpless before them.

Much of this, perhaps all of it, is due, we dare assert, not so much to a misunderstanding of the questions immediately under discussion as to absolute ignorance of the conditions underlying those questions, and moulding their form. Philosophy and science have taught us to view society as having developed from its early militant to its present industrial type along certain well-defined lines. But some how or other we feel an irresistible desire to view this process as complete, to consider the book of evolution closed, and to congratulate ourselves on being the summation of an infinite series. This false conception affects our actions. We fail to see that society is still changing and developing, that the laws that operated in the past are still at work.

This crude philosophy enters as a factor into our present labor complications when they are seen from a scientific stand-point. Old theories will not fit new facts, nor will antique remedies cure new troubles. Almost without an exception, employers look upon the employees as their inferiors, and treat them as such. From this follows ill feeling, desire for retaliation, perhaps criminal recklessness. We overlook the fact that the old feudal relation of master and servant is a thing of the past, and is not represented in our present economic organization. As Mr. Weeks acutely points out, discussions between employers and employed are 'permitted' by the former, interviews are 'granted,' committees are 'recognized.' Now, we need not blind ourselves to the ethical fact that there is a superiority of possessions as well as a superiority of physical force and of intellect, but in economic matters it cannot safely be pushed very far. The employers must climb down from this feudal pedestal, and meet their workmen on a level. Before the law and at the ballot-box, every man counts as one, and no more; and it is unreasonable to expect that in economic relations one party to a contract shall count as infinity, and the other as zero.

In the second place, a false political economy must bear its share of the responsibility. The employers have come to think that they pay the wages, and therefore may settle them as they see fit. But the wages question is, as Mr. Weeks says, a problem in distribution, and wages are paid out of the product (p. 11). By a figure of speech, they are paid by the employer, because, as industry is now organized, the product — the result of the combined effort of capitalist and laborer, we must always remember — goes into the hands of the employer as trustee, and he advances to his laborers each one's share as previously determined upon. Perhaps not even the laborer himself understands this clearly. The present methods have been in operation so long and on so enormous a scale, that it is not easy to look beyond them and see what they really stand for.

These two facts are typical of the steps to be taken in settling any labor dispute. The method laid down for scientific procedure by Bacon can find application in the field of industrial problems. First, we must clear our minds of all idols, all false notions and mistaken prejudices as to the inequality of the employer and the employed; and, second, we must observe facts and relations as they are, and not as it may suit our ideas to have them.

It is in these fundamental conditions that labor troubles arise. Strikes, lock-outs, boycotts, and so on, are the effects, not the causes, of labor troubles. By repressing them we are only sitting on the safety-valve. Hidden but potent forces are at work, and as sure as fate they will break out in another place if repressed in one. What we want is prevention of strikes, not a cure for them.

Have we any such prevention to suggest? Yes: we follow Mr. Weeks in favoring permanent boards of arbitration in which employers and employed are equally represented, presided over by a disinterested umpire. The great advantage of a permanent board of arbitration, holding stated meetings, is that it builds up an *entente cordiale* between the capitalist and the laborer. They learn to sympathize with each other, to know that an industrial problem may present two very different aspects from two different points of view; to see, in a measure, through each other's spectacles. The trouble with a temporary board of arbitration is that it is formed after the friction between the two parties has begun. It meets after a declaration of hostilities, not before; and its members, feeling that they have a certain position to defend, assume a semi-belligerent attitude. The theoretical advantages of a permanent board are forcibly

supported by the evidence Mr. Weeks cites from practice. In the hosiery and glove trade at Nottingham, England, a board of arbitration was established in 1860, and since that time not a single general strike nor difference about wages has occurred that was not settled amicably. The iron trade in the north of England has a similar story to tell. The *Conseils des prud'hommes* in France and Belgium bring cumulative evidence.

A coming-together of this kind every month or six weeks, and meeting as equals for the discussion of affairs of common interest and importance, would have a magic effect in ascertaining the facts and suggesting concessions, as well as in removing that false pride and foolish obstinacy that aggravate so much every dispute about labor. The present appeal to brute force is as absurd and worthless as it is antiquated. It is economically and ethically a crime. Knowledge, moderation, and Christian charity will permanently re-organize industry on a plane where the strikes and boycotts of mediaeval inheritance will be unknown.

NICHOLAS MURRAY BUTLER.

APPARITIONS AND HAUNTED HOUSES.

THE committee on apparitions and haunted houses, of the American society for psychical research, have issued a circular to invite communications from persons who may be able to help them in an examination of the phenomena that fall within their province.

They particularly desire information regarding supposed cases of apparitions of absent or deceased persons. It is well known that from time to time there are related or published accounts of people who are said to have seen, as present, persons who were at the time actually either absent or dead. As a proof of the genuineness of these appearances, the accounts frequently add that the persons who have had these experiences have learned, through them, about some otherwise unknown facts, afterwards verified; such, for instance, as death or illness, or some other calamity which has actually happened, at or near the time of the apparition itself, to the distant person whose appearance is narrated. Other proofs of the reality and significance of the supposed apparitions are sometimes narrated.

The committee wish to collect accounts, from trustworthy sources, of all such alleged occurrences, as well as accounts of other similar personal experiences which may have been striking enough for the persons concerned to remember, or perhaps record. Such accounts the committee propose to collate and examine, with a view to drawing such conclusions from them as may seem proper and warranted. In order that the results, if any are reached, may have value, the committee, while not wishing to exclude any information likely to be useful, will be especially glad to hear directly from the persons themselves who have had the experiences in question, with such further information as will enable the committee to verify the accounts given, whether by the accounts of other witnesses, by the use of documents, or by means of other collateral testimony. Persons who have information bearing on the matters before the committee may find the following questions useful guides in stating their evidence. Such answers as can be furnished, in any case, should be given as explicitly as possible, in the communications addressed to the committee.

1. To whom and when did the experience in question occur? What was his (or her) age, nationality, and occupation; and what was his (or her) state of health or of mind at the time of the apparition? At what hour of the day did it appear, and at what place?

2. Had the narrator of the experience in question ever had hallucinations, or seen apparitions before, or has such an occurrence ever happened since? If so, describe these other experiences, giving their time and place, and compare or contrast them with the one in question.

3. Does the narrator believe in ghosts? Or has he, before this experience, believed in apparitions of any sort, as probable sources of knowledge about absent or dead persons?

4. To what senses did the apparition appeal? If it appeared clearly to the eye, describe the color, the form, place, apparent distance, size, clearness, the length of time of endurance, and all other remembered qualities of the object seen. Was it 'as large as life,' i.e., as large as the person or thing supposed to have been seen would naturally have appeared? Were the other objects present at the time (such as the real wall, or a real table or chair) visible through it? Did it stand still, or move about? Did it remain clear, or come and go? Could it be touched? Was it seen in the darkness, or in the light? If the experience in question was not something seen, but something heard or felt, describe it as clearly as possible, and in a similarly definite manner, laying stress on whatever may show exactly what was experienced.

5. If the apparition seemed to give warning, or other knowledge of any future or distant fact, did the narrator relate the incident to any one, or give notice of the warning conveyed, *before* he was able to verify the facts supposed to have been revealed? Did he *record* these facts before he verified them? If so, is the record now extant, or

can it be placed for examination in the hands of the committee? What other persons have heard of this apparition? How soon did they hear of it? Can they now be communicated with? What are their addresses? If possible, transmit their accounts at the same time with the narrative of the one who actually experienced the apparition in question. If two or more had the experience in common, their names and separate narratives should be given. If this is not possible, give their names and addresses.

These questions are not meant to cover all the ground in every case, but only to indicate the information desired, and the most helpful sorts of information. In dealing with all these accounts, the committee will be governed by no pre-conceived theory or prejudice. They wish simply to hear and examine the facts, and to draw therefrom whatever conclusions may prove to be warranted by the evidence. To this end they invite friendly co-operation from all well-disposed persons.

Correspondents may feel assured that their communications will be treated as thoroughly confidential by the committee when specially requested so to treat them.

The committee may be able to devote a somewhat limited time to the personal examination of the phenomena connected with so-called haunted houses, and would be glad to hear of such phenomena from persons in the vicinity of Boston. The fullest details are requested from all who may offer information on this topic.

Communications may be addressed to any member of the committee, which is constituted as follows: Josiah Royce, chairman, Cambridge, Mass.; Morton Prince, M.D., secretary, Boston, Mass.; T. W. Higginson, Cambridge, Mass.; J. C. Ropes, 40 State Street, Boston, Mass.; F. E. Abbot, Cambridge, Mass.; Roland Thaxter, 98 Pinckney Street, Boston, Mass.; Woodward Hudson, Concord, Mass.

FOOD-CONSUMPTION.

THE Massachusetts bureau of statistics of labor devotes considerable space, in its last annual report, to this subject, on account of its vital connection with the condition of the workingman. The author says, very justly, that the food-problem is one of the most important that can engross the attention of the people, and of practical interest to the wage-worker, as much money is wasted in the purchase of food which might be saved by its expenditure in accordance with the results of scientific research. The truth of this is apparent to those who have observed how little the poor understand economy in the choice of foods.

The economic value of food-substances cannot be measured by their money cost, but by the amount and kind of nutritive material which they contain. This material the author divides into three different classes — viz., proteines, fats, and carbohydrates — in addition to the mineral matters, and bases the relative value of food-substances upon the available amounts contained.

The relative physiological values of the nutrients in different foods depend, first, upon their digestibility; and, second, upon their functions and the proportions in which they can replace each other in nutrition. Their accurate physiological valuation is, in the present state of our knowledge, impracticable; but their pecuniary costs are more nearly capable of approximation. From extended and careful comparisons of the composition and market prices of the more important animal and vegetable food-materials, which form the bulk of the food of the people, it is estimated that a pound of proteine costs, on the average, five times as much, and a pound of fats three times as much, as a pound of carbohydrates. Of these, proteine is physiologically the most important, as it is pecuniarily the most expensive, and its cost may be used as a means of comparing the relative cheapness or dearness of different food-materials. Taking the cost of food-materials in New York as a basis, and making allowance for the cost of the other nutrients, the proteine in a pound of sirloin beef at 25 cents is estimated at $1.06; in a pound of mutton at 22 cents, 91 cents; in a pound of oysters at 35 cents per quart, $3.36; in shad at 8 cents, 66 cents; in milk at 7 cents per quart, 53 cents; in wheat-bread at 8 cents, 38 cents; oatmeal and beans at 5 cents, 14 and 15 cents.

The nutrients of vegetable food are, in general, much less costly than in animal foods. The animal foods have, however, the advantage of containing a larger proportion of proteine and fats; and the proteine, at least, in more digestible forms. Among the animal foods, those which rank as delicacies are the costliest. Thus the proteine in oysters costs from two to three dollars, and in salmon rises to over five dollars per pound. In beef, mutton, and ham, it varies from $1.06 to 33 cents; in shad, bluefish, haddock, and halibut, the range is about the same; while in cod and mackerel, fresh and salted, it varies from 75 to as low as 31 cents per pound. Salt cod and salt mackerel are nearly always, fresh cod and mackerel often, and even the choicer fish, as bluefish and shad, when abundant, cheaper sources of proteine than any but the inferior kinds of meat. Among meats, pork is the cheapest; but salt pork or bacon has the disadvantage of containing very little proteine.

Oatmeal is one of the cheapest foods we have; that is, it furnishes more nutritive material, in proportion to the cost, than almost any other. Wheat-bread and rice, on the other hand, are the most expensive, in proportion to their cost, of the staple vegetable foods.

By taking into account all the nutritive substances, it is estimated that 25 cents will pay for .29 of a pound of nutrients in beef sirloin, .40 in round beef, and .92 in neck beef; oysters, .12 to .17; shad and bluefish, about .28: smoked herring, 1.21; cheese, 1.08 to 1.35; milk, .99; wheat-bread, 2.08 to 2.75, etc.

Of course, in the comparative value of foods, their actual physiological use is not unimportant. Foods rich in nutrients may not be readily assimilable, and only physiological experiments can finally determine their actual nutritive value.

From a study of the dietaries of factory and mill operatives, mechanics and other people engaged in manual labor in Massachusetts and Connecticut, the most noticeable features observed were the large quantities of food consumed, especially of animal food and fats. The total amount of nutrients per man per day varies in the Massachusetts dietaries from 690 grams to 1,052 grams; while in the European dietaries the normal range is from 653 to 863 grams. In the European the consumption of fats ranges from 13 to 100 grams, while in the Massachusetts dietaries in no case does it fall below 127, and reaches as high as 304 grams. If common usage in Europe, and the standards which are currently accepted there, are correct expressions of the proper quantities of food and of fat for healthful nutrition, the quantities of total food, of meats, and especially of fats, in the New England dietaries examined, are needlessly large, and in some instances excessively so. The dietaries studied all pointed in one direction, indicating that in this country a large excess of food is consumed, not only by well-to-do people, but also by those in moderate circumstances. This excess consists mainly in meats and sweetmeats, which are expensive, as well as physiologically injurious when consumed in too large quantities.

ELECTRIC LIGHTING IN ENGLAND.

OWING to the restrictions imposed by the act of 1882, electric lighting on any large scale is still a matter of the future in England, and the industry has not developed to any such extent as in Germany, Austria, Italy, or Belgium, and by no means as in this country. Perhaps partly from this interference with the development of a large system of distribution for electric lighting, and partly on account of the existence in England of large country houses in the possession of wealthy owners, the electrical illumination of single houses has been brought to a higher degree of perfection than domestic electric lighting in other countries. Men of wealth have constituted themselves into amateur electricians, the marvels of electricity apparently exerting a captivating influence upon their minds, and its study has been a hobby of many.

The pioneers of domestic lighting in England were Sir William Thomson, Sir William Armstrong, Mr. Coope, Mr. Sellon, and Mr. Charles Moseley. Sir William Thomson used a gas-engine, and worked his lamps directly from the dynamo, not only lighting his house, but also his class-room and laboratory in the University of Glasgow. Sir William Armstrong obtained his power from a waterfall in his ground. Mr. Coope used a steam-engine; and Mr. Sellon and Mr. Moseley relied on secondary batteries, obtaining their power from gas-engines.

The good examples thus set have been followed by many, and at present a great many private houses in all parts of the country are thoroughly and efficiently lighted. In fact, electric lighting is becoming a fashion, and in the opinion of Mr. Preece, as expressed at a recent meeting of the London society of arts, "the only fear of its ultimate general success is its falling into the hands of the inexperienced and ignorant."

Steam, gas, and water power have been satisfactorily used as agents for the production of power. Petroleum has not as yet had a trial in England, and wind is too uncertain to be relied on. Mr. Preece believes that a simple effective steam domestic motor has not as yet been introduced; but in this opinion he was criticised by Mr. Crompton of the Society of arts, who affirms that there are several English engines which could be worked by a gardener or butler as satisfactorily as a gas-engine. But most of the high-speed engines require more technical skill than is usually to be found among the domestics of an ordinary household. On this account the council of the Society of arts has under consideration a plan of offering prizes for the best engines designed to fill the special purposes of providing power for electric lighting. The competition will probably be extended to all classes of engines, — steam, gas, petroleum, or what not.

At present the gas-engines seem best adapted to supply the need. According to the statement of Mr. Preece, 25 cubic feet of gas will give us one horse-power, or eight 20 candle-power glow-lamps, or 160 candle-power all told; but five 5-feet burners will give only 75 candles when

burned in air with ordinary burners. Gas-engines, moreover, are within the intelligence of butlers, gardeners, and coachmen: they are always ready for work, they attain their maximum efficiency at once, and they can be stopped in a moment.

In England the opportunities of using water-power are few and far between. The power of the tide or that of a flow of the river is very small when utilized within the limits of ordinary people. The whole flow of the Thames through London bridge would maintain only 800 lamps. In Scotland, however, the case is somewhat different. There several persons have utilized the water stored up in lakes. Many wonder why the wind is never used; but, apart from its uncertainty and unreliability, there is the fact that the power developed by the best windmills is, on the average, but very small.

After referring to the sources of power, Mr. Preece turned his attention to the dynamo, and claimed that science, since the expiration of the Gramme patent, has converted a crude instrument into the most powerful converter of energy that exists. The forms of dynamo, he said, are being whittled down to two or three recognized shapes; but "as long as the spirit of rivalry is stirred up by competition and emulation, so long shall we have some manufacturer who will make a change for the sake of a change, and who will advertise his wares as the best in the world." Mr. Preece holds that little remains to be desired in the quality or price of dynamos, and that a well-constructed dynamo, kept clean and well lubricated, never overworked, should last a lifetime without much attention except to the brushes and commutator.

It is by means of the secondary battery that regularity and uniformity of current are maintained in isolated installations; and it supplies a reserve of force that renders one free from accident to engine or dynamo. Its early failures disappointed many; but Mr. Preece hopes that it has 'sown its wild oats,' and that it has become a mature, sober, practical instrument. Sir William Thomson writes, "My cells have worked to perfection. It is the greatest possible comfort to us in the house to have the light with satisfactorily equal brilliancy at all hours of the night and day, and every day in the week. I have now cut off the gas at the meter, so that there is absolutely none used in the house. I have no oil-lamps, and have not used so much as a single quarter of a candle within the last three months, and have the electric light in every part of the house where light can possibly be wanted by night or by day." Mr. Preece now uses the secondary batteries, not, as formerly, as regulators to his engine, but for the storage of electricity, charging them during the day, and discharging them through the lamps at night. He maintains that the durability of his cells is most satisfactory, and that he can see no reason why they should not last ten years at least.

Of the lamps, Mr. Preece could not chronicle so great progress as that of dynamos and secondary batteries, and he held that a good standard glow-lamp has not yet been devised. He would prefer a 10-candle lamp, working under a pressure of 50 volts, and requiring half an ampère: that would mean the absorption of 25 watts, or two and a half watts per candle. The life of such a lamp would not be very great; but, if it were cheap enough, one would not mind frequent renewals. Makers of lamps seem to consider that there is great credit in securing long life; but this may be unfortunate, considering the deterioration of glow-lamps with age, owing to the wasting-away of the carbon and its deposition on the glass globe. Mr. Preece would have a lamp such that we could afford to give it a 'short and merry life.'

There is felt in England, on account of the small development in the industry, a difficulty in obtaining experienced workmen; and in some cases it has been necessary to send nearly the length of the island for men to put in the wires and machinery.

Mr. Preece's estimation of the cost is just twice that of gas; but this, whether too high or too low, seems to be in doubt, and it is certain that the cost is largely dependent upon the extent to which the light shall be used. Considerable impatience is felt at the restrictions imposed by the act of 1882, and the council of the Society of arts is taking an active part in supporting the measure now before the house of lords, intending to extend the facilities for introducing electric lighting. This act is understood to be under the direct supervision of Lord Rayleigh.

THE PROPOSED FISHERIES BOARD OF GREAT BRITAIN.[1]

I am of opinion that the less the government interferes with any branch of industry, the better, and that, as a general rule, the cost and trouble of obtaining such scientific information as is necessary for the successful prosecution of a branch of industry ought to fall upon those who profit by it, and not upon the general body of the

[1] Letter in response to a request from the secretary of the Society of arts for Professor Huxley's views as to the constitution of a fisheries board.

tax-payers. I do not think that any sane man would propose to establish a government office, composed of chemists and metallurgists, for the purpose of managing the business of the iron-masters.

The case of the fishing industry, however, is peculiar. The different classes of fishermen tend to encroach on one another's liberties; and in the case of sea-fisheries the nation at large is proprietor, and has an interest in their being properly worked. Moreover, beyond the three-mile limit the interests of English fishermen may come into conflict with those of foreigners, and give rise to international questions of great difficulty and delicacy. Hence I have no doubt that some department of the government ought to be in close relation with the fisheries, ought to be able to interfere with them to some extent and under certain circumstances, and ought to be able to institute or undertake such scientific inquiries as may be needful in order to obtain satisfactory data for its action.

My first connection with fishery questions dates back now about a quarter of a century, and from that time to this I have taken every opportunity of urging the formation of a government department, such as I imagine is now about to be established, empowered to deal with the fisheries on these principles.

I think that such a fishery department should —

1. Collect accurate statistical and other information respecting the fisheries of England and bearing upon fishery interests in general, and present a yearly report, to be laid before parliament, based thereupon.

2. That it should be empowered to inquire into grievances of fishermen and suggestions for improvement of the fisheries. Hitherto the only method open to those who were, or supposed themselves to be, aggrieved was to get a royal commission of inquiry appointed. Within my experience, three of these commissions have inquired at intervals af eight or nine years, at great cost of trouble and money, into the same questions regarding the sea-fisheries, and have arrived at practically the same results.

3. That it should have power of inquiry to make orders regulating or restricting acts of fishery.

4. That it should be empowered to obtain such scientific assistance as may be needful.

It is to this last point that the questions addressed to me are more particularly directed; but I could hardly have answered them satisfactorily unless I had sketched forth my general views as to the justification and the limits of state interference in fishery matters. I have had something to do both with science and with administration, and it is in the interest of both that I express my strong conviction that they ought to be kept separate.

The function of the man of science is to ascertain facts, and give advice based upon that which he has ascertained. He may be the most competent person in the world to do that, and, at the same time, wholly unfit for administrative duties. If, again, we consider the four kinds of action to which, I believe, the operations of a fishery department should be restricted, what is the advantage of setting a skilled naturalist to collect and digest statistics, or to draw up regulations and orders, or to weary out his soul in the routine business of an administrative office? What he is wanted for is to act, first, as an assessor in inquiries, and, secondly, as an investigator of such problems as bear directly upon those fishery questions in which the general public is interested. For example, the nation at large has an interest in providing against the practice of unduly wasteful modes of fishing, as tending to the wanton destruction of its property; and I should say that any amount of money bestowed upon the scientific investigation of the effect of some modes of fishing might be well spent.

I am strongly of opinion that the best method of bringing science into its proper relation with the fishery department is that the latter, when it requires a scientific answer for an inquiry, or when it desires that a scientific problem should be thoroughly investigated, should apply to the president and council of the Royal society to nominate a person or persons to undertake the work. That is a course frequently pursued by other governmental departments, and it works very satisfactorily. However, if it should be thought better to have a permanent adviser, or a permanent committee of reference, I see no great objection to the adoption of either of these plans.

But what I desire to repudiate as strongly as possible, in the name and the interest of science, no less than in that of the working fisherman, is the proposal which I see continually pressed in letters addressed to the papers, to appoint a body of scientific men to 'manage' the fisheries. In the first place, the proposition is futile, for anybody who knows any thing about the feeling among the smack owners and working fishermen is aware that they would not listen to such a proposal for a moment. In the second place, the notion that the fisheries want managing by a government office, and that the fishing business, like every other, ought not, as far as possible, to be left to manage itself, is, in my opinion, utterly foolish and mischievous. And, in the third place, if the fisheries were to be thus managed, men of science are no more the right people to be intrusted with

managing fishery affairs than a landsman who happens to be master of the theory of navigation is the right man to be trusted with steering an ironclad.

The whole lesson of my somewhat lengthy and varied experience of fishery matters may be summed up thus: —

1. Don't meddle, unless you have good grounds for believing that you know what the effect of your meddling will be.

2. Listen to all that the scientific men without practical knowledge and the practical men without scientific knowledge have to say, but give to neither the power of directly interfering with such a large and important branch of industry as fishing.

3. Collect all the information that is to be had, so that the country may know year by year how the fisheries really stand; make that information accessible to the people who are engaged in the fishing industry; inquire into real or supposed grievances; and regulate or restrict, experimentally, on good cause shown.

4. Let the department charged with these duties obtain such scientific help as is needful from persons of recognized scientific competency, who are not under the control of the administrative department, and are not responsible to any one for the conclusions at which they may arrive. Moreover, let all scientific inquiries thus undertaken be strictly relevant, not merely to fishery matters, but to questions with which the state may properly deal as the representative of the general interest.

If the government is to be asked to give a body of scientific men a roving commission to inquire into the natural history of the seas and rivers of England, let that issue be put plainly before the minister to whom the application is made. But I do not see what the board of trade has to do with such 'aid to science,' nor why it is desirable that the gentlemen who are to be intrusted with this very considerable enterprise should have the 'management of the fisheries' — which means the power of meddling with a great industrial interest — thrown in as a sort of *hors d'oeuvre*.

T. H. HUXLEY.

March 20.

EXPLOSIONS IN COAL-MINES.

ATTENTION has been called to the connection which exists between gas-explosions in coal-mines and certain atmospheric conditions, which is expressed by saying that the number of such explosions is very considerably greater under low atmospheric pressure (under so-called barometric depression) than with a normal or high barometer. This is not a newly discovered fact, for it was recognized by Dickinson as early as 1852; and for nearly ten years past barometers have been used in many English coal-mines for observing the condition and changes of atmospheric pressure, and estimating therefrom, to some extent, the danger which may come from the latter source. But there is a growing conviction that the whole question needs further investigation, and particularly that experimental tests are necessary. Such tests, however, are very expensive, and for that reason little has been done hitherto in that direction. All the more noteworthy, therefore, are the numerous experiments which were undertaken last summer at the mines of Archduke Albert in Karwin, and which were on such a scale that the working of the entire mine was suspended at times in order to give a free field to the scientific investigations. Professor Suess has recently given an account of these important investigations in the geological institute at Vienna.

The district in which these observations were made comprises the greatest part of the archducal Gabriela mine. This portion obtains its fresh air from the Gabriela shaft, while the principal air-shaft, 500 metres to the west, serves as the up-cast shaft. At the latter a Quibal ventilator of 7.04 metres diameter was in operation during the whole course of the experiments. A similar ventilator of 12 metres diameter has been introduced recently.

The seams of the Gabriela mine belong to the most easterly portion of the Ostran-Karwin district, just on the edge of the Carpathian Mountains; and the mine joins the district of the Johann-Schacht where the accident of March 6, 1883, occurred. The stratification is nearly horizontal. On one occasion, after work in the mine had been stopped for six hours, the freshly exposed surface, where the miners had been at work, gave a crackling, blowing, and slightly hissing sound over its whole extent; and the escape of gas was detected not only by the lamp, but by the ear. Many of the puddles of water on the floor of the level were in slight agitation from the gas bubbling up through them. The old surfaces, however, were quiet, and experience has shown that the portions of the seam lying nearest workings lose their gas sooner or later, and cease to be dangerous. For the reason above explained, also, the working of drifts running directly into the seam requires the greatest precaution, and in the whole Ostran-Karwin district double workings are carried on in the deep levels for the sake of ventilation. The escaping gas is carried along by the draught produced by the ventilation, but local accumulations are unavoidable.

In order to obtain clear and convincing results in the investigations under discussion, a long series of analyses of the air from the well and regularly ventilated mine was made at the same time that barometric observations were taken. For the latter purpose a barograph was placed in the lowest part of the mine, at a depth of 230 metres, and the close correspondence between the changes of pressure at the surface and in the mine was ascertained. There a large number of daily analyses were made of the air taken from the ventilator, and also of air taken from a level in the seam by an independent apparatus.

These experiments were commenced in the beginning of June, 1885, and are still going on. The first report published by the archducal finance director in Teschen, based on the experiments made from June 5 to July 13, shows, that, when the barometer fell, the proportion of explosive gas in the ventilator and mine increased. The later experiments confirm this result in the most striking manner. The report referred to expresses the results of the early experiments as follows: —

1. The proportion of explosive gas in the mine air, generally speaking, decreases with increasing atmospheric pressure, and increases with a decreasing pressure.

2. The proportion of gas increases more rapidly the more suddenly the barometric curve falls, and decreases more rapidly the more suddenly the curve rises.

3. The development of the gas does not depend on the absolute amount of barometric depression.

4. If the barometric curve ascends at first suddenly and then slowly, or remains stationary for some time after reaching a maximum, a slow increase of gas is observed. If, after a sudden fall of the barometer, the pressure continues to decrease slowly, or remains stationary some time after reaching a minimum, a slow decrease of gas is observed. The maximum and minimum of the barometric curve, therefore, do not always correspond to the minimum and maximum of the gas curve.

Not content with these observations, a further series of experiments was undertaken. Work on the mine was stopped, and the air-supply shaft was closed while the ventilator was kept running, This experiment was begun at noon on June 20, and continued twenty-seven hours. In order to obtain the usual number of revolutions of the ventilator, the steam-pressure had to be increased. The barometric pressure in the mine sank 2.2 millimetres in five minutes, while the proportion of gas at the ventilator (which was ventilating other workings at the same time) rose to 0.83 per cent, and, at the level where separate collection was made, to about 0.40 per cent. In subsequent experiments a barometric depression of 4 millimetres was reached in the mine, the ventilator stopped, and in one case the gas in the level reached 1.35 per cent. This artificial depression of from 2.2 millimetres to 4 millimetres is certainly small in comparison with the natural variations in atmospheric pressure which are going on all the time, but its sudden production accelerated proportionally the flow of gas in the mine. Of the five severest accidents in coal-mines which have happened recently, four occurred during periods of especially low barometer. The accident at Polish Ostran on the 8th of October, 1884, occurred when the barometer sank 11 millimetres in forty-eight hours. The explosion at Karwin on March 6, 1885, took place on the second day of the fall of the barometer, which lasted three days and amounted to 16 millimetres. That at Saarbrücken occurred also on the second day of a fall of about 13 millimetres; and that at Clifton Hall on June 18, 1885, took place at the beginning of a fall. The accident at Dombran on March 7, 1885, is generally attributed to coal-dust. To these five accidents must now be added that at Spekul in Banat, which took place at nine o'clock in the morning of Oct. 29, 1885. In the absence of more accurate data, it may be remarked that on the 28th of October the barometer was 754.2 millimetres at seven in the morning, at Hermannstadt; on the 29th it was 750.6 millimetres, and on the 30th 749.8 millimetres.

It is superfluous to enlarge upon the experiments at Karwin. They confirm the views of the English experts and those expressed by Cowen before the English parliament in 1878, and it may be presumed that they will produce a change of opinion in other countries where those views are not known. They show the great importance of the barometer in coal-mining. The isobar-charts, which are obtaining a wider publication every year, show the daily progress of barometric minima over Europe, and they should be consulted in future by the managers of every coal-mine. The order is already in force at Karwin, forbidding blasting at all dangerous points on the approach of a barometric depression, and, if the danger increases, all work is to be suspended. M.

NOTES AND NEWS.

DR. PALISA of Vienna detected still another small planet, April 5: it was of the thirteenth magnitude, and will bring the total number of these bodies up to 257.

— The national museum has received a fine speci-

men of a ten-foot gray shark of strange form, of the Mediterranean species, — the first one of its kind ever taken in American waters. It was caught on the Carolina shores by the life-saving crews.

— Dr. E. M. Crookshank, in a recent paper on the cultivation of bacteria (*Journ. roy. micr. soc.*), describes and figures a peculiar fungus, Actinomyces (or the 'gray fungus'), the cause of a singular disease known as actinomycosis, occurring rarely in man, but not uncommonly in cattle. The fungus is believed to gain an entrance to the animal by the mouth, through the food, or possibly through the medium of a wound of the gums or a carious tooth. It sets up inflammation, resulting in the formation of a new growth, resembling a tuberculous nodule, which eventually terminates in large tumors. In cattle the lower jaw is usually affected, and then the upper jaw and neighboring parts, but the parasite may also occur in the lungs and the subcutaneous and intermuscular tissue. In man the pulmonary formations tend to break down early, forming fistulae and sinuses. In other cases the disease may originate in the intestines, or occur in the bones and other tissue. It may be transmitted by inoculation among cattle and rabbits, and presumably to man. The fungus is visible to the naked eye, appearing in the form of rosettes composed of club-shaped elements, and either colorless or of a yellowish or yellowish-green tinge.

— A recent communication, by Dr. Macgowan, to the China branch of the Royal Asiatic society, in relation to a supposed ancient phonograph, has elicited articles on the subject from several correspondents of the *North China herald*. The instrument to which Dr. Macgowan referred is known as 'the thousand-li speaker,' and is described by a writer of the seventeenth century. A correspondent of the *North China herald*, writing from Pekin, quotes from the 'Things of which Confucius did not speak,' and describes the instrument as follows: "It was a bamboo tube covered with a disk of glass and opened by a key. After speaking into it several thousand words, it was closed and carried to a distance not exceeding a thousand li. On opening it and applying the ear, a voice was still distinctly heard. If carried a greater distance, the voice became indistinct." Although the existence of such an instrument as a phonograph in China, in the seventeenth century, may be doubted, it is interesting to note one suggestion of Dr. Macgowan's. A thousand li in China is a considerable distance, and travelling in carts, or on horseback, over such abominable roads, is by no means a pleasant pastime ; and it is probable, that, from the jogging and bumping up and down sustained by the instrument, its mechanism would become disarranged, and the imprints on the metallic plates (if there were such) effaced, before a thousand li were travelled over. So long a distance, therefore, would be sufficient to cause the 'voice within the tube' to grow indistinct.

— Under the name of 'crystallized hopeine,' the *Chemical news* states that a substance is sold, having a slight odor of hops, but which has in its appearance, its crystalline form, and in all its reactions, a close resemblance to morphia.

— Contrary to the ordinary experience with copper salts, M. du Moulin, says the *Chemical news*, has succeeded in administering doses of half a gram to one gram of basic copper acetate to dogs and rabbits for six weeks without producing poisoning. Copper oxide and carbonate have also been administered to rabbits for a year without producing any appreciable injury.

— The French association for the advancement of science will hold its fifteenth meeting at Nancy, Aug. 12 next, under the presidency of Professor Friedel.

— The total amount of diamonds discovered in the diamond-fields of South Africa in 1885 is estimated at not less than 2,440,788 carats, valued at over twelve millions of dollars. The quantity is greater, but the value less, than the finds for the years 1883 and 1884. In 1884 the most valuable diamond now known was obtained, weighing, when first discovered, four hundred and fifty-seven carats, but which will be reduced, by cutting, to two hundred carats.

— Gambetta's brain was stated by Mr. A. Bloch, a few months ago, to be of unusually small size, weighing only 1,160 grams or 38.4 ounces. At the meeting of the Société d'anthropologie of March 18, Professor Duval added, further, some interesting details of its conformation and structure. In comparison with brains of subjects who were known to have been of deficient mental powers, such as possess only a feeble development of the third frontal convolution, Gambetta's brain was found to have an extreme development of this convolution, and the fissures very numerous and very complicated. This development furnishes confirmatory evidence of Broca's discovery of the localization of speech in this convolution. In addition to other peculiarities, the right quadrilateral lobe was found to be very complicated, with numerous fissures in its lower part; and the occipital lobe was extremely reduced, especially on the right side.

— Anent the opinion of Mr. Perry, that a max-

imum of earthquakes is coincident with the mean perigee, Dr. D. J. Macgowan recently submitted the following statistics to the Seismological society of Japan. They partially confirm also Professor Milne's observations that cold weather furnishes the maximum of frequency. Of 738 continental shocks, there occurred, in the

1st	month, 65	7th	month, 70
2d	" 82	8th	" 70
3d	" 72	9th	" 56
4th	" 49	10th	" 43
5th	" 46	11th	" 65
6th	" 63	12th	" 88

The first day of the first month occurs about Feb. 6, or at the new moon which falls nearest to the point when the sun is in the 15th degree of Aquarius. On these seismic records, the Chinese seldom designate the day of the month (moon) when earthquakes occur, yet a considerable number may be found. Seventy-two cases show twice as many in the first and second as in the third and fourth quarters of the moon's phases, — forty-eight in the former period, and twenty-four in the latter. The sixth day shows the largest number, 12; none took place on the 2d, 5th, 13th, or 14th; one occurred on each of the following: 4th, 7th, 17th, 20th, 22d, 23d, 24th, 28th, 29th. Hours are rarely given: so far as they go, they show that a large majority are nocturnal.

— The third annual report of the Massachusetts agricultural station deals chiefly with feeding-experiments and experimental researches upon the use of fertilizers, and the relative nutritive characters of prominent farm-crops. It contains a considerable amount of matter that will be of value to the agriculturalist.

— The well-known embryologist of the fish commission, Mr. John A. Ryder, is now engaged in studying the development of the mud-minnow (Melanura limi), and finds some remarkable amoeboid movements of the eggs before they are hatched. This is somewhat peculiar, and is the first time that it has been observed. By a series of ingenious contrivances, he is enabled to watch the process of development from the moment the fish is hatched until it assumes the characters of the adult.

— The London *Athenaeum* announces that Sir Henry Roscoe will probably be the president of the British association for 1887, when the association will hold its meeting in Manchester.

— Dr. W. N. Bullard, in a paper lately read before the Massachusetts medical society, gives a detailed analysis of the various symptoms of tea-poisoning, obtained from the study of a large series of cases. He arrives at the important conclusions, that the action of tea is cumulative, and is more pronounced on the young and those in a depressed physical condition, although persons otherwise healthy not infrequently show poisonous symptoms; that as a rule in the class of people examined by him, chiefly adult women, the average amount needed to cause poisonous symptoms was a little less than five cups daily; and that chronic tea-poisoning is a frequent affection, whose most common symptoms are loss of appetite, dyspepsia, palpitation, headache, vomiting and nausea, combined with nervousness, and hysterical and neuralgic affections, frequently accompanied by constipation and pain in the region of the heart.

— It has now been determined, says the London *Graphic*, to deal in a somewhat new manner with the difficult problem presented by the disposal of London sewage, which was a few years back considered solved by the simple process of emptying it into the Thames. For some months experiments have been made on what is known as the precipitation method; that is, the sewage is left in a tank until its solid portion separates, the separation being hastened by the addition of lime and proto-sulphate of iron. Hitherto a million gallons a day have been dealt with, but it is now determined to increase the plant so as to deal with nine times that quantity of sewage. Under this treatment the liquid portion becomes as clear as fresh water, and can be emptied direct into the Thames. The solid portion, or sludge, will be pressed into blocks resembling so much clay, and will be taken out to sea, to be discharged in deep water, where it can do no harm.

— According to Dr. E. Naumann, the director of the geological survey of Japan, the principal coal-deposits in the country are found in Kinshin and Yesso. The most productive coal-mine is that at Takashima, at which mine the daily production amounts to 750 tons. The mine of next importance is at Müke, which produces about 500 tons. The coal-fields at this spot are supposed to contain 150,000,000 tons, and it is probable that in the future Müke will become the principal coal-mine of the country. The production of coal in Japan during the year ending June 30, 1881, was 890,000 tons.

— At the congress of German physicists next September, there will be an exhibition of scientific photographs, to which all foreign scientists are invited to contribute, especially astronomers, spectroscopists, geologists, botanists, zoölogists, surgeons, etc. Further information may be obtained by addressing Dr. H. W. Vogel, 124 Kurfürstenstr., Berlin, W.

— The subject of an interesting paper by Mr.

Victor Mindeleff at the last meeting of the Washington anthropological society was 'The snake-dance of the Moqui Indians.' His paper was supplemented by the remarks of Dr. H. C. Yarrow, who visited New Mexico last summer for the purpose of studying in detail this peculiar and somewhat remarkable ceremony. This dance of the Moquis is, according to Dr. Yarrow, a prayer or supplication to their deity for rain. It is conducted by a secret order known as the Antelope and snake men. Snakes are employed under the belief that they are the sacred guardians of the clouds. The snakes used are largely venomous species (mostly rattlesnakes), although three or four harmless species were identified by Dr. Yarrow. Strange as it may seem, the Indians are seldom bitten, although they handle them with the utmost impunity. Painted in the most hideous and fantastic fashion, each participant catches a snake about the middle of the body with his teeth, and holds it in this position while he performs the dance. For several days previous to the ceremony, the snakes are taken through a course of treatment, which consists in stroking them repeatedly, and causing them to drink a decoction of some plant which they claim to be an antidote to the venom of the snake. This treatment renders them somewhat stupid and sluggish, which, in all probability, accounts for the few casualties which occur, although Dr. Yarrow saw rattlesnakes brought in fresh from the plains during the ceremony, and employed in the dance. Their non-combativeness can then be explained, he thinks, only upon the hypothesis of some hypnotic influence exerted by the attendant. An elaborate report on this subject by Dr. Yarrow will be published by the bureau of ethnology.

— Mr. Alvan Clark received April 9, from the Russian minister in Washington, the gold medal awarded to him a year ago by the emperor of Russia on recommendation of Otto Struve, the astronomer at Pulkova, who has charge of the great telescope made by Mr. Clark for the Russian government. The medal is of solid gold, 3-16 of an inch thick, and 3 5-8 inches in diameter. On one side a handsomely engraved wreath of oak-leaves encircles the words '*Praemia digno*,' and on the other side is a profile likeness of the emperor, surrounded by the inscription, 'Alexander III. *Totius* Russiae imperator.'

— The first annual report of the Montreal botanic garden gives a list of the known gardens of the world, from which it appears that there are one hundred and ninety-seven, the most of them, it is believed, scientific in character. Germany has the largest number, — thirty-four; Italy, twenty-three; France, twenty; Great Britain and Ireland, twelve; West Indies, six; and the United States, five. More than half of all are supported by the state, and only about five per cent by private enterprise; the remainder, by the city, and educational institutions. Nearly ninety per cent are free to the public, and more than two-thirds are open on Sundays. The one at Montreal will include about seventy-five acres, although only about eighteen will constitute the garden proper, within which will be the various buildings, pond, and all the beds of herbaceous plants.

— Mr. Brayton Ives, formerly president of the New York stock exchange, and well known as a collector of books, has written a preface for the American edition of Mr. George Rae's work, 'The country banker; his clients, cares, and work,' which Messrs. Scribner have just issued. As Mr. Bagehot's 'Lombard Street' pictured the life and cares of the city banker, Mr. Rae's describes the not less interesting life of the country banker.

— Now that the time is approaching when sail-boats, great and small, are to be put into commission, Messrs. Charles Scribner's Sons' announcement of a practical 'Boat-sailer's manual' is very timely. The author is Lieut. Edward F. Qualtrough of the navy. He has made a complete treatise on the management of sailing-boats of all kinds, and under all conditions of weather; containing, also, concise descriptions of the various rigs in general use at home and abroad, directions for handling sailing-canoes, and the rudiments of cutter and sloop sailing.

— Mr. Andrew Carnegie's new book, 'Triumphant democracy,' will be published on April 17.

— The Numismatic and antiquarian society of Philadelphia has undertaken the preparation of an archaeological map to embrace the valleys of the Delaware and Susquehanna rivers, and desires co-operation in this important work. The map is intended to show the location of all the principal remains attributed to the Indian tribes who formerly occupied these regions. It will include contiguous portions of the states of Pennsylvania, New York, New Jersey, Delaware, and Maryland. Societies and individuals are earnestly requested to furnish whatever information they may possess concerning the following classes of antiquities: gravel deposits (paleolithic); artificial shell-heaps; cave retreats; encampments or village sites; earth-works; old fields; quarries; work-shops; surface deposits of implements, or caches; large rocks in place, used as mortars; rock inscriptions (*in situ*); burial-places; tumuli, or mounds; Indian trails. A full description and accurate location of any of the above should be

given. How far and in what direction from nearest town? On or near what stream, if any? On whose property? The occurrence of native objects of copper, or articles of European introduction, should be mentioned. Communications may be addressed to Henry Phillips, jun., secretary, Philadelphia.

— Naturalists will be pleased to learn of the early publication of Mr. Scudder's extensive work on New England butterflies, which has been nearly completed for a number of years. Those who have seen the elegant colored plates, and are aware of the thorough monographic way in which each species is treated, will appreciate the value of the work. The author is desirous of obtaining additional material for the illustration and description of the earlier stages of a number of species, and will welcome any assistance that may be afforded him in diminishing his list of desiderata.

— Hardly a week passes without the announcement of some new literary or scientific enterprise from Germany. This time it is the appearance of the opening number of a *Zeitschrift für assyriologie* that we have to announce. It is published by Schulze at Leipzig, and Assyrian scholars speak very highly of the part just issued.

— Lea & Son's 'Encyclopaedia of dentistry,' an important work on odontological science now publishing, will contain extended illustrated articles on the teeth of vertebrates, both fossil and recent, and of invertebrates,— on the former by Mr. J. H. Wortman, and on the latter by Mr. W. H. Dall.

— William Paul Gerhard's 'A guide to sanitary house-inspection' (New York, *Wiley*, 1885) will serve as a comprehensive *vade mecum* for the house-holder and house-hunter. It contains succinct and complete instructions for the sanitary inspection of city and country dwellings, and for the choice of their surroundings. Much of the contents common sense and common prudence ought to suggest to the intelligent person; but, unfortunately, common sense and common prudence in sanitary matters are not usually the attributes of the ordinary householder, nor indeed frequently of the educated one, as witness a case of a city physician in good practice who failed to discover in many months that the sewerage connections of his house were untrapped. For those who cannot employ an expert, this book can be recommended as a useful guide in building or in the choice of dwellings.

— Mr. W. T. Hornaday of the national museum will shortly issue his second book, 'Canoe and rifle on the Orinoco,' being a history of his hunting and exploring experiences on that river.

— There has recently been issued by Cupples, Upham & Co. of Boston a pamphlet on the present condition of electric lighting, written by one N. H. Schilling, Ph.D., purporting to be a report made at Munich, Sept. 26, 1885. To whom this report was made is not stated in the volume; but from the statement made at the bottom of p. 5, that 'no business loss has been sustained by us' by the introduction of electricity for lighting the Munich railway-station, "since gas-motors are used for the production of the current," it is natural to suppose that the report was made to one of the gas companies of that city. Similar references occur on other pages, and the report cannot, therefore, be considered an unbiassed statement of the present condition of electric lighting.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Preliminary description of a new squirrel from Minnesota (Sciurus carolinensis hypophaeus[1] sp. nov.).

ONE of my mammal collectors has recently sent me from Sherbourne county, Minnesota, a number of specimens of the gray squirrel of that region. The locality is considerably north of the supposed northern limit of the animal's range, and the specimens differ markedly from the previously described varieties of the species. They are as large as, or slightly larger than, their nearest ally, Sciurus carolinensis leucotis, with which they agree in the size and bushiness of the tail and in the color of the upper parts. They differ from it, 1°, in having broader ears, the convexities of which are adorned with large and very conspicuous white woolly tufts, the yellowish-buff being confined to a narrow strip along their anterior borders; 2°, in having the white of the under parts very much restricted. The color of the back and sides encroaches everywhere upon the belly, leaving a small and irregularly defined patch of white in the centre of the abdominal region, and even this is usually much mixed with gray. The breast and throat are grizzled gray, more or less strongly suffused with yellowish fulvous. The pelage is noticeably softer and denser than in the common gray squirrel. C. HART MERRIAM.

Names of the Canadian Rocky Mountain peaks.

I willingly admit the inaccuracy of the correction as to the names of some Rocky Mountain peaks made on my authority by Mr. Ernest Ingersoll in *Science* (vii. No. 165). Had I supposed that Mr. Ingersoll would have thought it worth while to publish any note on the subject, I would have been more precise in specifying the names to which it should apply. Mr. Ingersoll, in his original article, wrote (*Science*, vii. No. 162), "Many of the principal peaks in this part of the range were long ago named Balfour,

[1] Ὑπόφαιος; ὑπό, below; φαιός, dark — in allusion to the dark color of under parts.

Forbes, Hooker, and Brown, by the lamented botanist Douglas, after English men of science." Of these names, Balfour and Forbes were given by Dr. Hector; Hooker and Brown (as pointed out by your correspondent A. G.), by Douglas. Besides Mounts Balfour and Forbes, Dr. Hector, in 1858–59, attached the names of scientific worthies to a number of peaks in this part of the mountains. Amongst these are Lyell, Richardson, Murchison, Lefroy, Bourgeau, and Sabine. Some of the peaks so named are visible from the line of the Canadian Pacific railway. The names, not only of Douglas himself, but also those of Drummond and Hector, deserve to be perpetuated in connection with this part of the mountains, and in a map (the result of explorations by the geological survey) now in course of preparation for publication these will appear. GEORGE M. DAWSON.

Ottawa, April 10.

Science at Cornell.

The undergraduates of Cornell university are becoming agitated over the question whether that great institution is becoming a technical school. Three-fourths of their number are in non-technical courses, and that in an institution the fundamental law of which declares that it is founded and receives its endowments for the specific purpose of promoting agriculture and the useful arts. But so serious a question is this, that the president, in his remarks at the alumni dinner at New York recently, considered it necessary to assert his conviction that enough had been done for the technical departments, and that the endowments and income of the university should be directed to the establishment of law and other schools apparently never contemplated by the founders of the institution, or authorized by the law and the charter.

The chance remark of Mr. Cornell, that he would found an "institution in which any person can receive instruction in any study," and the fact that the value of the endowment, as given by the general government, was, at the time of its presentation, but a fraction of the amount since realized from it, are made the basis of an ingenious argument for the restriction of the appropriation for agriculture and the arts to half a million dollars; while the remainder of the endowment, amounting to several millions, should be, in the opinion of the successor of Andrew D. White, devoted to other purposes.

Where are the traditions and the law and charter of Cornell? and where are the trustees and constituency, which have been hitherto regarded as the defenders of this great trust, instituted for the benefit of the people and the technical education of their sons and daughters?

The fact seems to be, as shown in this address, that the gift of the general government, presented to the state of New York for the purpose of founding and maintaining technical colleges, originally in the form of land-scrip, and worth, as stated, some six hundred thousand dollars, was, by carefully locating the land and by persistent 'holding on,' finally made to produce several millions of dollars, and to form the main dependence of this university, in which the 'leading objects' are prescribed to be "to teach such branches of learning as are related to agriculture and the mechanic arts." But it has evidently required some ingenuity, not to say sophistry, to find an excuse for turning the magnificent grant of the United States into a law school, a school of medicine, or a school of divinity, as speakers at the Cornell dinner are reported to have proposed. It would seem to the outside looker-on that the original provisions of the law and the charter, which have been above quoted, and which further allow scientific and classical studies to be taught, nevertheless must stand, despite the efforts and desires of those who have no knowledge of, or sympathy with, technical education, and that all gifts, from whatever source, should be subject to the fundamental law.

That Cornell should become a true university, in the sense that it should embrace colleges of all the branches and departments coming within the scope of its charter, as far as is possible consistently with the original objects of its foundation, is evidently desirable, not only in itself, but also for the purpose of lending assistance to the students in these 'leading branches,' who have the ability and the desire to become liberally educated; but that such a foundation should be diverted to law, or medicine, or divinity schools, seems preposterous, and it is a question whether the university may not forfeit its charter should such counsels prevail. There are many other institutions in the state of New York looking with wishful eyes upon the grand endowment of Cornell.

H. N.

A convenient way of indicating localities upon labels.

In the careful working-up of a local flora or fauna it becomes necessary to indicate many localities which have not well-known names. This is commonly done by means of more or less lengthy descriptions of the locality. But this plan involves much labor, and is also undesirable from the fact that the data can be attached to the specimen only by means of cumbersome labels, or by reference to a note-book. To avoid these objectionable features, I have devised a system which meets the desired end in a simple manner. This system was suggested to me by the way in which the position of localities are indicated in the city of Washington.

For the purposes of our local survey a well-known point on the university grounds is taken as a centre. Upon a map of this locality, a north and south line and an east and west line are drawn through this point. These lines are marked *O*. Other lines are drawn parallel to these lines, dividing the map into squares, each line indicating a distance of one kilometre. These lines are numbered, beginning in each case at the one next the zero line, and reading towards the margin of the page. By means of roads, streams, and other conspicuous objects, the position, upon the map, of any locality, can be easily ascertained; and its distance north or south of one zero line, and east or west of the other, seen at a glance. It is only necessary to write figures indicating these co-ordinates upon a printed blank label to accurately indicate the locality. This label should have printed upon it the name of the centre of reference; it may also have letters indicating two of the cardinal points of the compass. In the latter case four sets of labels would be necessary. The following is an example: —

Cornell U. N. E. This filled out might read as follows: Cornell U. N. 23, E. 16½.

J. HENRY COMSTOCK.

Entomological laboratory, Cornell university, April 8.

SCIENCE.—SUPPLEMENT.

FRIDAY, APRIL 16, 1886.

INVENTORY OF PHILOSOPHY TAUGHT IN AMERICAN COLLEGES.

IN the general overhauling which the college curriculum has been receiving of late, there has been one subject quite generally overlooked, — that of philosophy. Apart from an occasional editorial note in the columns of *Science*, I have seen next to no allusion to the matter. Yet it is difficult to see how we are to develop a high grade of national culture in science and in literary matters without contact, by way either of stimulus or of mirroring, or of both, of these matters with philosophic principles. Where this contact is to occur, unless in college, it is also difficult to see. I have no intention of discussing these matters here; but I wish to give an inventory of the present condition of philosophic instruction in our colleges, based upon the catalogues of these institutions. Neither my knowledge nor the limit of space allows me to go beyond a consideration of the subject taught to discuss methods, etc.

The philosophic discipline of the ordinary American college is a survival of that period of its existence when its especial deed was to furnish to the community well-fortified ministers of the gospel. The catalogues of our colleges reveal all stages of evolution from this original source, but all show their genetic connection. The extent of the evolution may be shown by considering the courses of four of the older New England institutions, selected from as many states. In Dartmouth the instruction begins with a twenty-four-hour course in natural theology, followed by twenty hours of anthropology. The *piece de resistance* is sixty hours of psychology (Porter's 'Elements'), which is supplemented by courses in ethics (twenty-five hours), history of ancient philosophy (twenty-six hours), aesthetics (fifteen hours), and, to complete the circle with which the instruction began, a thirty-hour course in the evidences of Christianity. All this, certainly no insignificant amount, is required work. There is one elective of 'thirty-two hours in the history of modern philosophy.

Crossing the Connecticut River, and coming to the University of Vermont, we find the following courses: psychology (Sully), logic (Davis's 'Theory of thought'), ethics (Calderwood), a short course in aesthetics, another short one in the evidences of religion, and quite an extensive course in metaphysics, in which Watson's 'Kant's philosophy in extracts,' and the exposition of Kant by Professor Morris, are used. At Williams, as in the University of Vermont, all philosophical work seems to be required, the curriculum including the following subjects: anthropology (Hopkins's 'Outline study of man'), logic, theology (dogmatic, apparently), natural theology (through the medium of Flint's 'Theism,' and Butler's 'Analogy'), ethics, and the history of philosophy. At Brown we find logic, three hours a week; intellectual philosophy, four hours, including studies in Hamilton, Kant, Porter, Sully; ethics, five hours, including Wayland, Calderwood, Kant, etc. There is also a course in natural theology. In addition to these required courses, there is an elective in the history of philosophy.

None of these colleges, it will be observed, is now a professedly denominational college. It may be well, accordingly, to add one which is; viz., Trinity. Here the required work is ethics (through the medium of Wayland), Butler's 'Analogy' and his sermons, metaphysics (Sir W. Hamilton), and courses in psychology and logic. Elective courses are those in anthropology (Hopkins); ethics, two courses, — one in Haven, and the other in Whewell and Plutarch, and metaphysics (McCosh). No very great differentiation is observable in these courses, although there is more ethics, and more ethics from a theological stand-point, in Trinity than in other colleges.

We turn now to the other end of the scale of evolution, where the courses are almost wholly lecture courses, and are, either entirely or in the major part, elective; and in which, also, the instruction is mainly from the historical side. Of such institutions, Harvard and the University of Michigan are instances, perhaps the only ones. In the latter college, the only required study in this line is a course in either psychology (Murray) or logic (Jevons). Elective courses are, two in psychology, one in experimental and another in its relations to philosophic problems. The course in the history of philosophy is three hours a week through the year. This is supplemented by a three-hour course in the principles of philosophy, followed by a study of Hegel's 'Logic.' The courses under the general head of ethics would include a course in ethics, historical and theoretical; one in the philosophy of state and history; and a course each

in Plato's 'Republic' and Aristotle's 'Ethics,' occupying together two hours per week through the year. Other courses are, one in Spencer's 'First principles,' and one each in aesthetics and Kant's 'Critique of pure reason,' the latter two being omitted this year.

The Harvard courses include in the history of philosophy, English philosophy, from Locke to Hume; French, from Descartes to Leibnitz; and German, from Kant to Hegel; and one each in German philosophy of the present day and Hegel's 'Phaenomenologie,' which are omitted the present year. Psychology and logic (Bain and Jevons) are covered in one course; there is also an advanced course in experimental psychology. There is a course in the philosophy of nature, discussing Spinoza and Spencer. There are also five courses in ethics and philosophy of religion, comprehending one on philosophy in relation to ethics and religion (Royce's 'Religious aspects of philosophy'); one on philosophy of religion; another on philosophic theism; one on historical ethics, including especially, it appears, Mill and Kant; and one on practical ethics of modern society. The account would be incomplete if we failed to notice Professor Goodwin's courses in Plato's 'Republic,' and in the history of philosophy before Aristotle, with Professor Greenough's course on later Greek philosophy. All of these courses are elective. It will be noticed that there are about the same number of courses given in both the two last-mentioned universities, but the courses appear to cover more hours per year at Harvard than at Michigan.

Intermediate between the two classes of colleges discussed, come, in the east, Yale and Princeton; in the west, the universities of Wisconsin and California. At Princeton there are required courses in psychology, logic, ethics, and Christian evidences; elective courses in physiological psychology, metaphysics, history of philosophy, and science of religion; and graduate courses in Plato's 'Philosophy,' and one hour per week of discussion of philosophic problems. At Yale almost the only required studies in the senior year are the philosophic courses. The required studies are as follows: logic, psychology, ethics, natural theology, and evidences of Christianity; the electives are, the history of philosophy, two hours through the year; a course in Locke and Berkeley for two hours first half-year, followed by 'special topics' the second half; and a two-hour course in physiological psychology through the year.

The list of colleges given might be considerably increased; but it suffices, I think, to justify the division of colleges, so far as their philosophic teaching is concerned, into three classes, of which the first would include by far the greater number of institutions. Did space permit, it would be interesting to give the courses in two or three of the best Canadian colleges. The practice there is to divide the subjects into 'pass' and 'honor' subjects; the former being psychology, logic, and ethics, and the latter including quite a wide range. At McGill, for instance, besides courses in the history of ancient and modern philosophy, the student must pass an examination on twelve masterpieces; for example, Aristotle's 'Ethics,' Descartes' 'Method and meditations,' Spinoza's 'Ethics,' Fraser's 'Berkeley,' Spencer's 'First principles,' etc. At University college, Toronto, this honor-work requires such solid reading as Green's 'Introduction to Hume,' and his 'Prolegomena to ethics.'

For the most part, these courses speak for themselves to one familiar with the courses in German universities, or even in Great Britain in the present renaissance of philosophy there. The greatest lack is undoubtedly in the department of the philosophy of nature. The philosophic interpretation and criticism of the principles of modern science seem to be unknown save at Harvard and the University of Michigan. The greatest advance which any one familiar with the philosophic announcements of the last eight or ten years will notice is the growing tendency to introduce the history of philosophy, and especially the study of the originals, particularly in Plato, Aristotle, Kant, and even Hegel. A striking and welcome phenomenon is the increasing disuse of Sir William Hamilton. I do not say this with especial reference to his philosophy, but because it is safe to say that the sole ideas which the vast majority of graduates of our colleges have of continental philosophy, have come, directly or indirectly, through Hamilton and Cousin; and it is difficult to say which is the more misleading as an authority in historic philosophy. Princeton presents one innovation, whence, I think, almost all of our colleges could learn something. It has called in men from its biological department to discuss physiological psychology. The discussion of the one subject of visual sensation and perception could easily be made remarkably fruitful for psychology, as well as leading up to the subject of space-perception in general, and the question of empiricism and intuitionalism, and the function of evolution in psychical life. It is no discredit to our teachers of philosophy to say that it is almost impossible that they should have special knowledge in physiological psychology. The instructor of to-day has now, in the subject of logic, psychology, ethics, the history of philosophy, and what is vaguely called 'metaphysics,' to cover a wider field than the

teacher of any other branch ; and restriction of subjects rather than their enlargement is the need.

It is impossible to discuss the subject of the future of philosophy-teaching in this country without reference to the mooted question of 'electives.' It is evident that the great majority of those American colleges that have not introduced the elective system are giving all the time to philosophic studies possible, though I do not undertake to say whether or not that time be distributed in the wisest way. In fact, the outside scoffer would probably say that relatively too much time is given them, when all studies are required. It will be noticed that the colleges where least philosophy is required are the ones where most is taught, and the ground is most widely covered. Personally, I should not be surprised to know that they are the ones where most vital interest is taken in these studies, save in the instances, happily many, of the smaller colleges, where the philosophic teaching is in the hands of a man of such strong character that the teaching is a lasting power for life in an ethical way, whatever may be said of the strictly technical value of the philosophy taught. JOHN DEWEY.

INSECTIVOROUS PLANTS.

THE peculiar insect-capturing habits of certain of our native plants were observed nearly a century ago, and the belief was then entertained that the peculiar phenomena served some direct object in the plants' economy ; in other words, that the captured insects served as nutritive material. These observations, however, were long forgotten, or received but little attention, till, in 1875, Darwin's well-known work on insectivorous plants appeared. Since then a very great impetus has been received by botanists in their study, that has resulted in large additions to the literature of the subject. In a recent paper by the well-known botanist of Jena, Prof. W. Detmers (*Nord und süd*, 1886, 72, 81), a review of our present knowledge is given, from which the following is obtained.

At present it is well known that the function of the green tissue is the absorption of carbonic acid from the surrounding medium under the influence of light, and its decomposition and formation therefrom of organic compounds. Most of the higher plants are capable of complete and perfect development solely by the aid of purely inorganic materials, though in the larger number organic matter may and does form a share of the nutritive material. In the economy of nature this function is a most important one, as plants thus occupy an intermediate position between the animal and inorganic kingdoms.

But some plants are not thus provided with the green or chlorophyl tissue, and are dependent more or less upon organic foods. In some, as the mildews, the power of transforming inorganic to organic substances is wholly wanting ; while in others, as, for instance, certain orchids, such as Neottia nidus avus, the power is much restricted. Likewise the mistletoe, though sufficiently rich in chlorophyl, derives much of its material from the sap of trees upon which it is parasitic. Insectivorous plants, in the same way, seem to occupy an intermediate position between those dependent entirely upon inorganic and those which derive their material purely from organic sources.

The term 'insectivorous,' as applied to plants, is, however, not strictly correct, nor would 'carnivorous' be much better. Different forms of animal life are captured by such plants as have received this appellation, and by the aid of secreted juices are digested and absorbed ; but there is no mechanical action except in capturing and holding the objects, and therefore 'flesh-digesting' would express more correctly the process.

One of the best known of insectivorous plants is the 'sundew' plant (Drosera), species of which are distributed over nearly the whole world. It is small and low, growing about meadowy places, and conspicuous for the sparkling drops of fluid substance that are seen upon its leaves. The leaves, which are about four millimetres in diameter, have upon their upper surface a large number of peculiar tentacle-like organs, as many as two hundred in some cases. The ones in the middle are shorter and upright ; those near the sides, longer and more horizontal. Each tentacle consists of a stem, permeated by a spiral tube, and a glandular head, which emits a drop of colorless, sticky, and stringy fluid. This substance apparently serves to attract insects as well as to retain them when once they have alighted upon the leaf, as it is seldom that they are able to extricate themselves after coming in contact with it. To yet further assure this retention, the leaves possess the power of closing or folding together, brought about slowly by the irritation conveyed through the tentacles. An insect thus firmly enclosed remains till the fluids secreted by the tentacular glands have caused its solution, or, more properly, digestion. Any foreign object, be it mineral or animal, will cause the closure of the leaf and the secretion of fluids ; but there is this remarkable difference, — a mineral substance only produces the flow of an acid secretion, while an insect or piece of flesh causes, in addition, a

secretion of pepsin. The process is almost precisely like that which occurs in the animal stomach, — a secretion of acids and ferment produced by the contact of digestible substances. The ferment or pepsin is not, however, a peculiarity of such plants alone. The milky sap of many others contains the same substance, and almost generally throughout the vegetable kingdom a ferment is produced in seeds during germination, rendering the reserve material, upon which the young plant is dependent, assimilable.

Yet better known is another plant of the same family (Droseraceae), the venus fly-trap (Dionaea), that grows in the wet lands of North Carolina. The leaves, about six centimetres in length, springing from the ground, have an elongated, winged stalk, bearing an orbicular leaf at its extremity, which is capable of sudden folding or closure. Along the margin of each leaf are a number of long, immovable, bristly hairs; and near the middle of each side, on the upper surface, three slender irritable hairs, which have the peculiar power, when touched, of conveying the irritation to the leaf-tissue, and causing immediate closure, the marginal bristles crossing each other, and preventing any possibility of escape. In addition to these hairs, there are a large number of glandular bodies attached by a short stem, which not only secrete the digestive fluids, but also serve as absorptive organs for the digested material. An insect or any digestible substance caught by this singular contrivance remains enclosed a relatively long time, while an inorganic or non-digestible object is much sooner released.

In a very different way the leaves of species of the pitcher-plant (Nepenthes) serve to entrap insects. Here the long leaf is prolonged into a tendril, which bears at its apex a tubular or oblong pitcher, sometimes a foot or more in length, closed with a hinged lid. About its rim there are a number of nectar-secreting glands, by which insects, and especially ants, are attracted. Entering easily into the upper part of the tube, they fall from the smooth surface to the bottom. Here there is a very large number of secreting glands, which, singularly, only in consequence of the irritation produced by the insects, pour out a considerable quantity of digestive fluid. This secretion shows, in the presence of albumen and flesh, a strong acid reaction, which, together with the associated pepsin, acts energetically upon animal substances, digesting them in a short time.

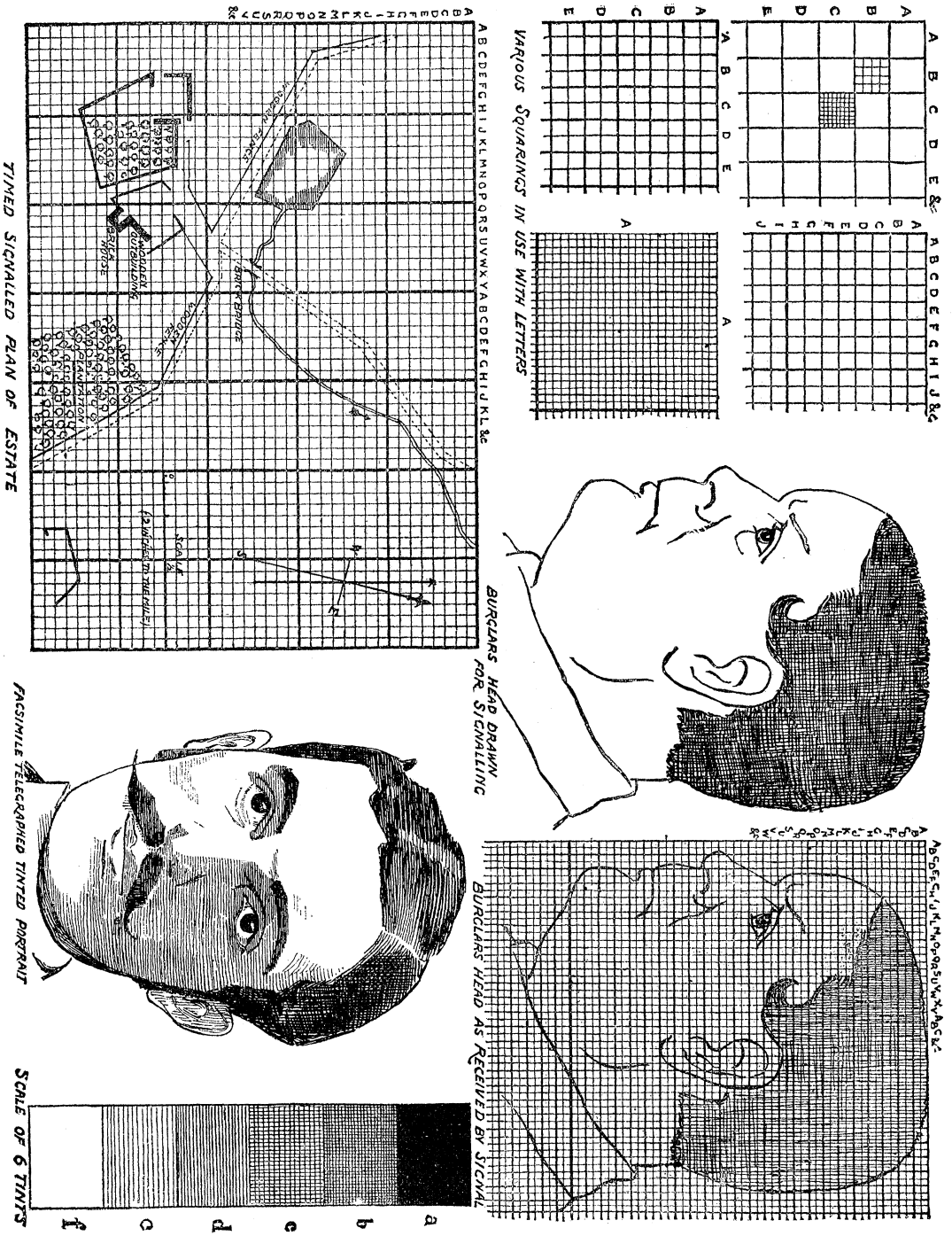
Again, species of our native Saracenia have the ascending hollow leaves so enclosed by a lid as to prevent the entrance of rain-water, but, by the nectar glands, attract and entrap insects, which are digested by the abundant secretion at the bottom. In addition to these, the aquatic bladderworts, or Utricularia of Europe and North America, although secreting no digestive fluid, may properly be classed among the insectivorous plants. The small bladders are so closed by a valve as to admit the ingress of insects, crustaceans, or newly hatched fish, but prevent their egress; and, from the large number that they are frequently found to contain, it is very probable that the ensuing decomposition is of direct advantage to the plant in furnishing nutritive, absorbable compounds.

The question, finally, whether organic material obtained and dissolved by the plant in the ways briefly described is indispensable or serviceable as nutrition, is important. Various carnivorous plants have been cultivated, secluded for a long time from all contact with organic material, without apparent deterioration in their development, so that it may at once be determined that such matter is not indispensable. However, in experiments with plants of Drosera rotundifolia, all kept under precisely the same circumstances, except that some were deprived entirely of organic food-material, while others received insects from time to time, it was found that the latter throve much better, and fructified much more abundantly.

These views, that the substances are of direct benefit to the plant, are, however, contested by Dr. Behr in a late number of the *Pharmaceutische rundschau*, who claims that it is not proved that the dissolved material is taken up as nutritive material, and so made use of. Its presence within the cells, or in the tissue of the plants, may be explained by simple capillarity, which is further evidenced by the absorption of inorganic substances, such as arsenious acid, by means of the secretions, as has been recently shown by Jaeger.

This opinion Dr. Behr supports by observations on species of Nepenthes, where he found that the pitchers, after the reception and solution of insects, were in no wise strengthened, but became injured and withered; and in cases of Drosera sulfurea and rosulata, where he likewise found that the leaves which had captured an insect always withered, and where many leaves were thus robbed of their true function, the plant weakened and died. He mentions the singular fact that the larvae of certain insects (Xanthoptera semicocca) are known to live in the exudations of Saracenia variolaris without being affected by the digestive fluids, — habits very similar to the known ones of bot-flies in the animal stomach.

It is very difficult indeed to understand how such remarkable contrivances, in connection with true digestive fluids, can exist, save on the theory that their function is a real one, and that they



subserve some direct use in plant-economy, and are not, as Dr. Behr would affirm, acquired peculiarities directly injurious to the organism.

A METHOD OF SIGNALLING DIAGRAMS.

AN ingenious system of adapting the alphabetical messages of the electric telegraph, or of the

heliograph, or any other signalling apparatus, to the reproduction at distant points of some kinds of drawings, has been recently contrived by Mr. Alexander Glen of England, and is described in the London *Illustrated news* of March 20. It seems likely to be of some utility in military operations, as it is especially suitable for the transmission of small maps or plans of a locality. The design to be transmitted is drawn on ruled paper, divided into little squares by vertical and horizontal lines. The operator at the transmitting-station can thus indicate by alphabetical letters to the receiver any point on the paper falling in the centre of any square; the person at the receiving-station will apply his pencil to that point, and will then be directed to the next point, drawing a line with the pencil, and so on to form a complete outline-drawing. Patches of shading, of the several darker or lighter tints shown in a separate diagram, may be put in by special directions.

BIBLIOGRAPHY OF INDIAN LANGUAGES.

Many years since, the present director of the bureau of ethnology became interested in Indian tribes of the west, and began to study their languages. The study of the spoken language from the mouths of the speakers naturally led to the study of books containing accounts of languages no longer spoken, or spoken by people not personally visited. As books began to be studied, the desire and the need of examining more books relating to the subject were felt to be necessary for the solution of the problems involved. A card-catalogue was therefore begun, of the books, pamphlets, magazine and other articles, manuscripts, etc., which were needful for an exhaustive study of the relationships of the native tribes as based upon language. This catalogue grew and grew. How great it was or is destined to become, if absolutely completed and perfected, no one yet knows.

Every lover of systematic, complete, and accurate work owes a debt of thankfulness to the bureau of ethnology and the compiler of this formidable volume; and he owes this debt, not because the work is complete (for it is still incomplete), and not because it is free from inaccuracies (for there are inaccuracies, though these are neither important nor numerous), but he is grateful for this monument of systematic, thorough-going research, and for a persistent devotion to a lofty ideal of bibliographic work. Had a less lofty ideal of completeness or excellence been set up, the book would have been beyond all criticism. The very excellence of the ideal affords ground, and the only ground, for the friendly criticism we beg to offer.

The titlepage of this printed but unpublished book is, and is intended to be, a standing invitation to criticism from all competent judges. We say printed but not published, since a manuscript note informs us, 'one hundred copies printed,' and the printed titlepage informs us that these one hundred volumes are 'distributed only to collaborators,' and also that they are 'proof-sheets.'

It is the fulness of the present catalogue, the time and labor spent upon it, the bibliographic spirit which pervades it, taken together with the titlepage, that bring into the strongest relief the perfect ideal in the author's mind, and at the same time his clear perception of the mode, and the only mode, for the attainment of this ideal. The author has set before him, and kept steadily in view, the purpose, first, of hunting up every scrap of published, printed, and even manuscript information in existence, relating to the subject; second, of recording a description of each work so full and so complete that it need never be recorded more fully or more completely; third, of telling where each work catalogued may be found; fourth, of giving a clear notion of what the document is, and what it contains relative to his subject, telling where, within the work cited, the linguistic material is to be found; and, lastly, of so putting the whole together that whoever has occasion to use this bibliography may learn all that he needs or cares to know about any book catalogued, and its contents, without actually seeing it at all.

The value of any work so broadly conceived and so fully executed as this, can hardly be overstated. With the great increase of knowledge in all directions, it is absolutely essential to progress that the fields to be investigated be first systematically mapped out, to the end that seeming new discoveries may be new, and not rediscoveries, and that energy be not, through ignorance, wasted in repeating work already well done. The sciences are now advanced to that state, that further satisfactory progress is only to be made by ascertaining what has already been done. To this end, and to so exhibit the work already accomplished in any line, is the work of the bibliographer. The general outline of the proposed plan of the bibliography is here shown, and the opinions of competent judges as to its merits and defects are respectfully solicited with a view to their use in the finished book or books, if books should be found necessary to contain the material which shall constitute the work.

Proof-sheets of a bibliography of the languages of the North American Indians. By James Constantine Pilling. Washington, *Government*, 1885. 1175 p. 4°.

Preceding the general alphabetical authors' list of books, which constitutes the great bulk of the book, is a list of the bibliographical authorities consulted, this list numbering a hundred and twelve entries, covering twenty-six pages. This list, being one subordinate to the general purpose for which the book is to be used, might go in a subordinate or smaller type, thus saving in two ways; to wit, in the space occupied, and in showing by the type itself that the list was subordinate to the main body of the work. In the very full index at the close of the book, and which constitutes the subject-catalogue, this plan is followed with good effect, and a complete subject-catalogue of Indian linguistics is thus printed on forty-five closely printed pages.

The serial numbers which accompany each title, and which are printed on the left, would interfere less with the catch-word of the title if transferred to the right; and the catch-word, the author's name, might then advantageously be brought to the left, a little beyond the line of the text. These detailed matters of printing here introduced and commented upon, though in general uncalled for, are pertinent to the present notice, since these are proof-sheets, and hence the finally adopted form is presumably not yet settled. Moreover, these questions admit of a more intelligent and satisfactory settlement from the existence in print of this material, which might, perchance, be denominated "Proof-sheets of material collected with a view of constructing an exhaustive bibliography of the languages of the native races of North America." This would seem to be a tolerably precise characterization of both the book and the author's conception of it. The term 'Indian' on the titlepage is of course used to include all native races, Eskimo, Aztecs, etc. Whether the word should be so used, is a matter for the ethnographer rather than the bibliographer.

The size of the work, and the fact that while going through the press two hundred and fifty pages of additions and corrections accumulated, show the importance of considering whether finally it will not be better to break this bibliography up into several subdivisions, so that, instead of having a very large bibliography of North American linguistics, we may have a more useful work, consisting of several parts, each devoted to a special group of languages, such as Algonkin, Eskimo, etc. All bibliographies should provide for growth. In any very comprehensive one, the first part begins to be antiquated before the last part is reached. Moreover, bibliographies, if of comparatively small subjects, can be revised, and kept up to date; but it is a formidable undertaking to revise, enlarge, and bring up to date, a work so large as this.

As the present tendency is pronouncedly in the direction of full bibliographies of small subjects, the most important question to be considered in the publication of this work would seem to be as to whether it should be one single bibliography of a very large subject, or a series of bibliographies of a number of small subjects.

Would it be better to prepare a bibliography of mathematics, or a series of bibliographies, on the different subdivisions of mathematics? And in meteorology will the signal service best serve the meteorological public by issuing one grand bibliography of meteorology, covering the entire field, or by subdividing into various heads, such as 'observations,' 'instruments,' 'theories,' etc., and issuing smaller bibliographies, covering the more limited fields? It is not our purpose to discuss these questions, but, rather, to sharply draw attention to them for the purpose of having them well considered before a final form is adopted.

The author is, in our opinion, to be congratulated upon selecting the form of an authors' catalogue rather than the subject-catalogue. The authors' catalogue admits practically of but a single arrangement, — the alphabetic, — since in any large list the chronological order proves of far less general utility.

The subject-catalogue, however, admits of several arrangements: it is always subject to radical changes based upon increased knowledge or new and revised systems of classification; and, lastly, to use a subject-catalogue, the system of classification used in that particular catalogue must be studied. It therefore seems far wiser, as Mr. Pilling has done, to make the index serve as the subject-catalogue.

DISEASES OF THE FORE-BRAIN.

THE scope of this work is indicated in its title. It is an attempt to explain both the nature of mental action and the perversions of that action from the data of the anatomist and the pathologist. Professor Meynert has no superior in Europe in the department in which he has written. To him anatomists owe much that is new and important in the knowledge of the structure of the brain. It is to be expected, therefore, that the results of his life-work should be regarded with great interest. In a comparatively small

Psychiatry: a clinical treatise on diseases of the fore-brain, based upon a study of its structure, functions, and nutrition. Part i. By THEODOR MEYNERT, M.D. Tr. by B. Sachs, M.D. New York, *Putnam*, 1885. 8°.

compass he has given an exhaustive description of the masses of gray matter and intricate network of white fibres of which the brain consists; and he has done this from the stand-point of a comparative anatomist, which greatly enhances the values of his statements. There is such rapid progress being made in the department of nervous diseases, that it is perhaps not surprising that a few of the positions held by the author will need to be modified in the second volume: in fact, he admits this in his preface. But the great mass of the facts stated in the text are fixed and definite, and must be familiar to all future investigators in this field.

To the general reader the physiological portion of the volume will be much more attractive than its anatomical details. Here, again, Meynert is worthy of attention. It is pretty generally admitted that the method of introspection so long advocated by psychologists is incapable of giving satisfactory results in the investigation of those processes in which mind and matter meet: hence of late years new methods have been sought. One of these is to study the mental processes as they develop in the infant, and to watch the manner in which ideas are acquired and voluntary powers become available. This method has been employed by Preyer and Kussmaul in Germany, and by Dr. Mary Putnam Jacobi in this country. Meynert has made use of it to some extent in discussing the manner in which knowledge is acquired and stored up, and in which the various memories gained through the senses are associated. For example: if a pin touches the eye of an infant, the lid closes. This is a reflex act carried out by a simple mechanism independent of any act of consciousness; but, coincident with the reflex act, a number of impulses are sent to the brain, along fibres which, on reaching the cortex, give rise to the conscious perception of the appearance of the pin, of the pain of the prick, and of the motion which has been performed. Each of these perceptions occurs in a different part of the brain, since each sensory organ is joined to an area of its own. But the three perceptions occur simultaneously; and, as all parts of the cortex are joined with one another by fibres passing from one area to the next, the three perceptions are associated both in perception and in memory: hence, when the pin is seen again, the memory of the pain arises, and the memory of the motion which stopped the pain; and thus the mere sight of the pin leads the child to close the eye. The perception of the reflex motion has given the infant the knowledge of the possession of a muscle capable of movement; and the motion, having once become conscious, can be reproduced voluntarily by an effort which excites to action those cells which retain the memory of the motion (pp. 156–161).

A second method of psychological investigation is that of experimental physiology. This is open to the objection that many acts of animals are misinterpreted by physiologists, who look at many of the acts as manifestations of voluntary mental action instead of being instinctive. The differences of those who advocate or oppose the localization of functions as deduced from experiments are to be traced rather to their varying interpretations of the result of the experiments than to those results themselves. Meynert is a believer in the localization of functions, as is every physician who has seen much of brain-diseases, and he presents clearly the arguments in its favor derived from the investigations of Fritsch and Hitzig and Munk. A third means of studying the relations of mind and matter is the consideration of individuals who present disturbances of mind associated with definite forms of destruction of brain-tissue. Meynert's opportunities for such study are very great, as he has at his disposal the immense number of patients collected in the Vienna hospital. That he has made good use of his material is evident in the sections of this work which treat of the functions and nutrition of the brain. In the next volume this part of the work will be fully expanded. By means of these three methods much that is new and entertaining has been found in the physiology of thought, and much that is important both to the alienist and to the psychologist is brought forward. The book, therefore, appeals to a rather wider circle of readers than its title would indicate.

Those who have read the original will sympathize with the translator in the difficulties of his work. It is a misfortune of the author that he is at points exceedingly abstruse and even obscure; and this fact, as well as the very technical style of the original, has rendered the task undertaken a serious one. It has been done in a painstaking manner, the original being followed as closely as possible, without, at the same time, taking from the English its own construction and idiom. The translation has been made with the consent of the author and by one of his pupils. It is evident that he has labored hard, although in some places the meaning is difficult to grasp. This difficulty is to be traced to the original, as can be determined by a comparison of the two, and hence must not be laid at the door of the translator. The manner in which the publishers have presented the volumes is to be commended, no expense having been spared in reproducing the many valuable diagrams and illustrations of the original.

M. A. S.